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Non-neoplastic and Neoplastic lesions of lung- Histopathological study with clinic- radiological correlation.

Author details:
Dr Minu Cherian Kailath
MBBS, MD Pathology
Senior Resident
Sree Mookambika Institute Of Medical Sciences
Kulashekaram
Kanyakumari
Ph: 8867576440
Mail: minucherry18@gmail.com

Introduction

Lung lesions are diverse and can vary in size, shape and density. They can be non-neoplastic and neoplastic. The causes of lung lesions can be smoking, pollution, infections, malnutrition, inflammatory conditions, benign, or primary and metastatic cancers.[1]

Lung lesions can appear as spots, nodules, opacities or masses on imaging studies like chest X-ray and CT scans. Clinically, lung lesions can be asymptomatic to varying signs and symptoms like dyspnoea, cough and haemoptysis.

The most common procedure for evaluating radiological or clinical abnormality in lung are

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lung biopsies.[2] There are several types of lung biopsy procedures like bronchoscopic biopy, CT guided biopsy, core needle biopsy, transbronchial and endobronchial biopsy. Other procedures include lobectomy, resection, cyst removal etc.[3]

Lung cancer is the leading cause of cancer - related death globally. According to the latest studies, in 2022, approximately 81,748 new cases of lung cancer reported in India and2.48 million new cases, worldwide.[4] Lungs are also a commonest site of metastasis from many primary cancers.[1]

Histopathological examination plays a crucial role in accurate diagnosis of various lung lesions.[5] They are traditionally classified into two subtypes i.e. Small cell carcinoma and Non-small cell carcinoma.[6]

Identifying and understanding these lesions is crucial for early and effective treatment, helping to prevent complications and improve patient outcomes.

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Materials and Methods

This observational study was conducted in the department of pathology in a tertiary care hospital from January 2023 to January 2025 (1 year). A total of 106 cases were studied.

Inclusion criteria: All the lung biopsies during the study period were included in this study irrespective of them being non-neoplastic and neoplastic, benign and malignant nature including primary and metastases.

Exclusion Criteria: Pleural and mediastinal biopsies were excluded from this study.

The specimens were fixed in 10% formalin, subjected to routine tissue processing then paraffin embedded sections were made, followed by H&E staining and slides were prepared. Patient information including age, sex, clinical details and diagnosis were collected from the hospital records. Radiological findings were also obtained and correlated.

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Results

In the present study 106 lung biopsy where evaluated and both neoplastic and non-neoplastic lung lesions obtained. The lung lesions were more commonly seen in males (57,53.8%) than females (49,46.2%) Table1. Malignant lesions were seen more commonly in males (50,57.5%).

The age distribution was between 21-90 years and most cases was between 61-70 years (41,38.7%) followed by 51-60 years (30,28.3%). Table 2. The malignant cases were more common in the age group between 61-70 (34,39%) followed by 51-50 years (25,28.7%).

The lesions were more common on the right-side lung (57,53.8%) than left side lung (49,46.2%) (Table 3) with more lesions on the unilateral lung (82,77.3%) and that too more on the lower lobe (59,71.9%) than upper lobe (19,23.2%) and few on the hilar region (4,4.87%).

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The patients presented to the OPD with varied signs and symptoms and some asymptomatic or incidental finding, but more common symptom was breathlessness and cough (52,66.6%). The clinical suspicion led to radiological imaging where the lung lesions was seen in (59,55.6%). Majority were seen as masses (39,52.5%) followed by cavitary lesions (11,18.6%), opacities (5,8.47%), consolidation, honey combing and fungal ball (4,6.78% each) and as cystic lesion (1,1.69%). The clinical and radiological correlation was 96.2%.

To confirm the diagnosis, tissue was obtained and sent for histopathological evaluation. Most of the lung tissue were obtained by CT-guided lung biopsy (84,79.2%) which gave adequate sample for diagnosis. Other procedures are listed in Table 4.

Out of 106 lesions studied, malignant lesions (87,82.07%) were more common than benign lesion (19,17.92%). Various malignant and

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benign lesions encountered in the study are listed in the Tables 5 and 6. Most common malignant tumours were non-small cell carcinoma, (Fig A to D) within which adenocarcinoma being the commonest. Spindle cell tumours, neuroendocrine (Fig E and F) and small cell carcinoma (Fig G) cases were also seen. The correlation between radiology and histopathology was 93.39%.

Table 1: Gender distribution (n=106)

Males	57(53.8%)
Females	49(46.2%)

Table 2: Age distribution (in years) (n=106)

21-30	2(1.89%)
31-40	4(3.77%)
41-50	14(13.2%)
51-60	30(28.3%)
61-70	41(38.7%)
71-80	14(13.2%)
81-90	1(0.9%)

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Table 3: Side distribution (n=106)

Right lung	57(53.8%)
Left lung	49(46.2%)

Table 4: Procedures done

CT-guided lung biopsies	84(79.2%)
Bronchoscopic biopsy	7(6.6%)
Endobronchial biopsy	6(5.6%)
Transbronchial biopsy	3(2.8%)
Core needle biopsy	1(0.9%)
Resection	1(0.9%)
Cyst removal	1(0.9%)
Lobectomy	3(2.8%)

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Table 5: Histopathological Diagnoses of Malignant Lesions (n=87)

Diagnosis	Number (%)
Adenocarcinoma	26(24.5%)
Non-small cell carcinoma	25(23.6%)
Poorly differentiated carcinoma	8(7.5%)
Squamous cell carcinoma	8(7.5%)
Small cell carcinoma	2(1.9%)
Neuroendocrine tumour	1(0.9%)
Spindle cell neoplasm	6(5.7%)
High-grade sarcoma	1(0.9%)

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Malignant neoplasm	2(1.9%)
Malignant small round cell	1(0.9%)
Combined small cell carcinoma with squamous component	1(0.9%)
Metastasis	3(2.8%)
Suggestive of malignancy	3(2.8%)

Table 6: Histopathological Diagnoses of Benign Lesions (n=19)

Diagnosis	Number (%)
Organizing pneumonia	3(2.8%)
Bronchiectasis	3(2.8%)
Aspergilloma	2(1.9%)
Invasive pulmonary aspergillosis	1(0.9%)
Granulomatous	2(1.9%)
Echinococcus	1(0.9%)
Infection	2(1.9%)
Inflammatory	1(0.9%)
Necrotic	1(0.9%)
Others	1(0.9%)

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Non-diagnostic	2(1.9%)

Discussion

In the present study, males to female ratio was 1.16:1. Similar results are seen in studies done by Garima et al[4,] Agarwal et al[7], Shah et al[8], Krishnamurthy et al[9], Malik PS et al[10], Mandal et al[11], Lad et al[1], Banerjee et al[12], Bhatti et al[13], Kinnari et al[14], Pradeep et al[15] where males predominate with male to female ratio ranging from 2:1 to 6:1.

In the study, both SCC and Adenocarcinoma was predominantly seen in males and it is in par with the studies done by Bhatti et al[13],

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Shah et al[8] and Bordeni et al[16]. In the study by Aditi et al[6], females were more commonly affected than males and adenocarcinoma was seen more in females compared to squamous cell carcinoma seen predominantly in males.

The age group mostly affected by lung lesions in this study were 6th to 7th decade (41,38.7%) followed by 5th to 6th decade (30,28.3%). It is in par with the studies done by Aditi et al[6], Lad et al[1], Anjan Das et al[17] and Chandramouli et al[18]. But in the studies done by Shah et al[8], Agarwal et al[7] and Malik et al[10], 5th to 6th decade cases were predominant. In the present study, malignant lesions were also more commonly seen in 6th to 7th decade.

The present study had maximum number of lung lesions in the right lung (57,53.8%) when compared to left (49,46.2%) and it is in concordance with Garima et al [4], Agarwal et al[7], Disha et al[5], Sarfaz et al[19], Thakkar et al[20], Dhatwalia et al [21].

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Radiological evaluation showed mass lesion (39,52.5%) in majority cases in this study and it is in concordance with the studies done by Disha et al[5] (29.09%) and Sharma et al[22]. The lesions were predominantly located peripherally, similar to the studies done by Garima et al[4], Agarwal et al[7] and Rawat J et al[23].

In the current study, malignant lesions (87,82.07%) were more common than benign lesions (19,17.92%). Similar findings were seen in the studies done by Lad et al[1] (63.41%), Kinnari et al[14] (75.6%), Pradeep et al[15](75%) and Disha et al[5].

Among malignant cases, our study encountered adenocarcinoma cases (26,24.5%) were majority followed by the generalized category of non-small cell carcinoma (25,23.6%), without subtyping. This is in concordance with the studies done by Aditi et al[6] (72%), Krishnamurthy et al[9], Pradeep Kumar et al[15], Kinnari et al[14], Banerjee et al[12],

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Bordoni et al[16], Deependra et al[24], Agarwal et al[7], Malik et al[10], Garima et al[4] and Lad et al[1].

In the studies done by Shah et al[8], Chandramouli et al[18] and Bhatti et al[13], squamous cell carcinoma was more common than adenocarcinoma.

Among benign lesions, various lesions were studied and infectious and granulomatous lesions were common. In the studies done by Garima et al[4], inflammatory lesions were more common than granulomatous lesions, while in the study done by Disha et al[5], granulomatous lesions were predominant.

All the biopsies were recommended immunohistochemistry for further subtyping.

Conclusion

Lung biopsy remains a gold standard for diagnosis of both neoplastic and non-neoplastic lung lesions. Clinic-radiological suspicion is always confirmed by histopathological evaluation. The most

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encountered diagnosis is adenocarcinoma lung and lung cancer incidence has increased worldwide. Middle-aged males are commonly affected in the study. Non-neoplastic lesions are equally common and important with inflammatory, infectious and granulomatous lesions being commonest among them.

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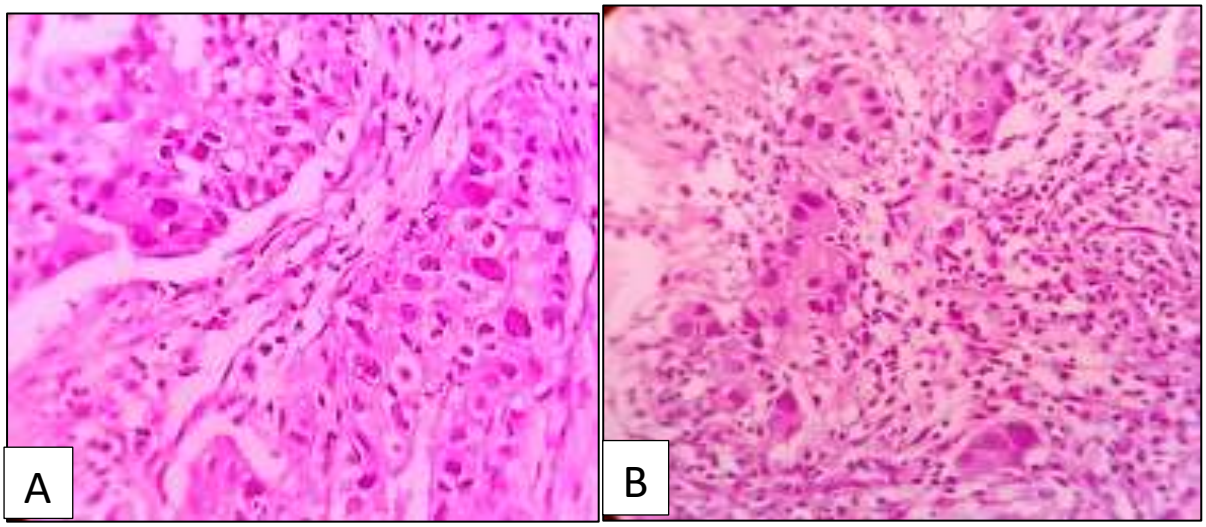

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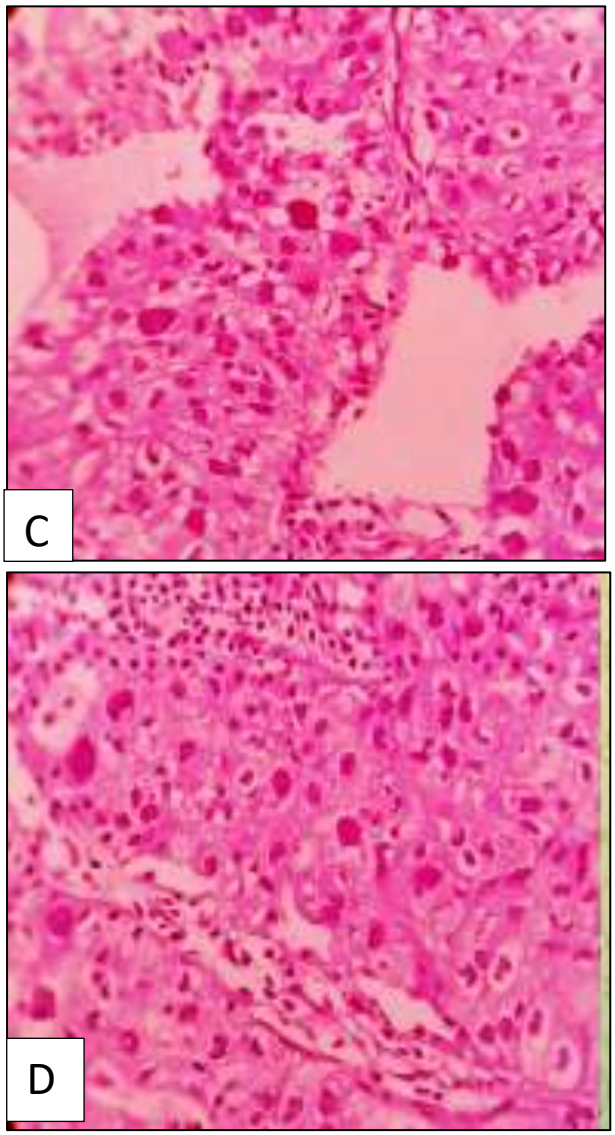

Fig A to D: Non-Small cell carcinoma: neoplasm composed of tumour cells arranged in nests. Individual tumour cells are moderate to markedly pleomorphic polygonal cells with high N:C ratio, hyperchromatic nuclei & abundant eosinophilic to vacuolated cytoplasm. Surrounding stroma shows desmoplasia.

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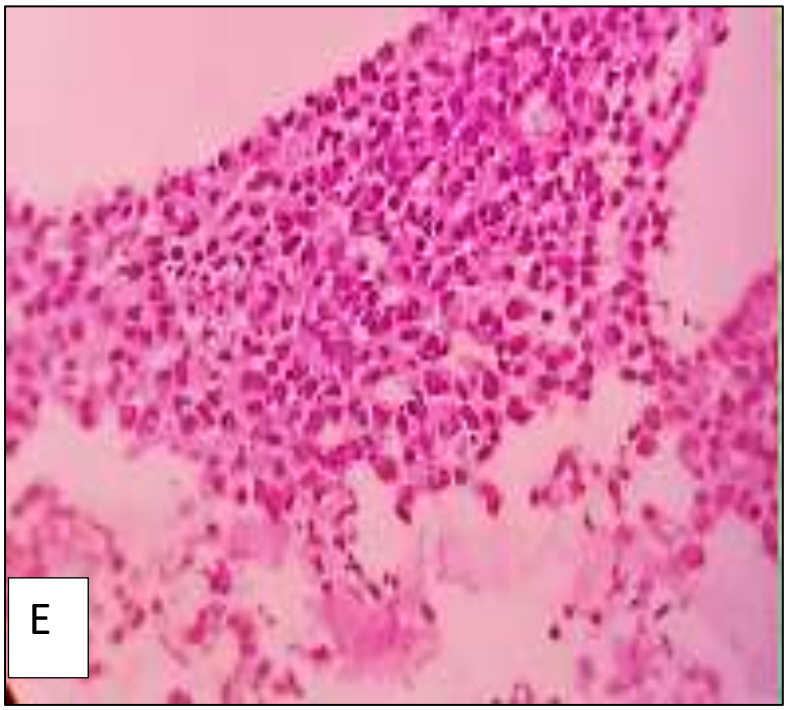

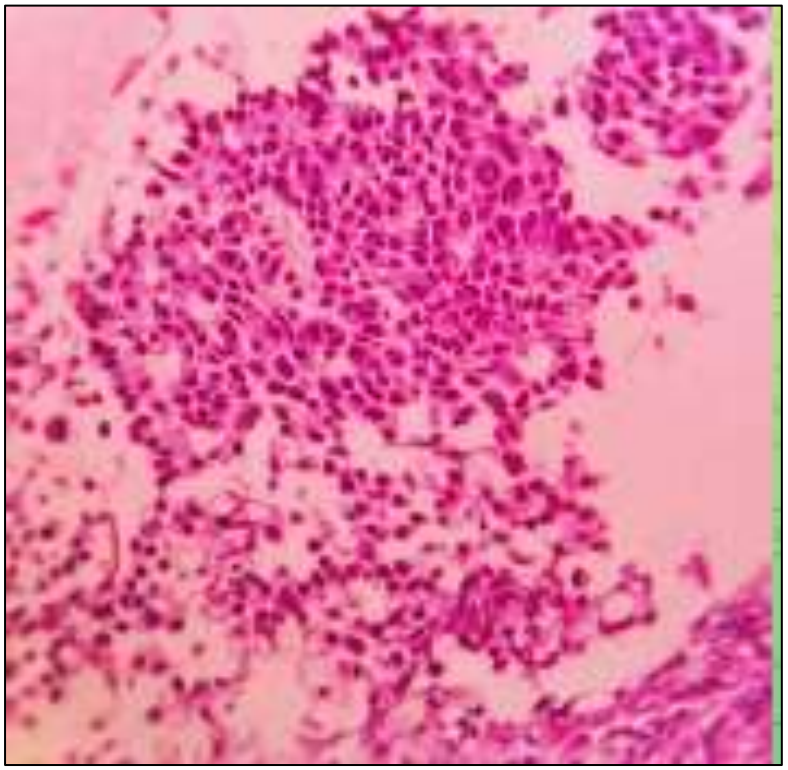

Fig E and F: Neuroendocrine tumour: neoplasm arranged in sheets, nests, & cribriform pattern with individual rounded tumour cells with ovoid hyperchromatic smudged nuclei & moderate pale amphophilic granular cytoplasm.

Fig G: Small cell carcinoma- small cells arranged in single and nested pattern composed with rounded nuclei showing irregular nuclear membrane and bland chromatin, inconspicuous nucleoli and granular eosinophilic cytoplasm

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